DOCUMENT RESUME

ED 290 451 IR 012 999

AUTHOR Stoecker, John W.
TITLE Teacher Training for Keyboarding Instruction--Grades 4-8: A Researched and Field Tested Inservice Model.
PUB DATE [88]
NOTE 72p.; Content of this material is the basis for a presentation at the National Educational Computing Conference, "NECC 88" (8th, Dallas, TX, June 15-17, 1988).
PUB TYPE Guides - Non-Classroom Use (055) -- Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS Computer Software; Elementary Education; *Elementary School Students; *Elementary School Teachers; Field Tests; *Inservice Teacher Education; *Keyboarding (Data Entry); *Microcomputers; Pretests Posttests; Program Effectiveness; School Supervision; School Surveys; Tables (Data); *Typewriting; Workshops

ABSTRACT

This study assessed the status of touch-typing in school districts in Oregon and Washington, and developed and field tested a comprehensive training program designed to prepare elementary teachers to teach touch-typing skills to elementary students. There were four major activities: (1) a questionnaire was developed and mailed to a random sample of 409 supervisors of elementary curriculum, of whom 217 (54%) returned the questionnaire; (2) a trainer's manual was developed for an inservice program to prepare teachers to teach touch-typing to elementary students; (3) a six-hour workshop was held for 37 teachers who had made arrangements to teach a group of students immediately following the workshop; and (4) teachers collected pre/post data from the students they taught. This report is divided into three chapters. The introductory chapter includes a rationale for the study, a statement of the problem, a brief review of the literature, and an overview of the study population and procedures. The second chapter presents detailed analyses of the data collected by the survey, as well as evaluations of the workshop content and the effectiveness of the touch-typing programs being taught by the workshop participants after two weeks of instruction. A summary of the study findings is presented in the final chapter together with the conclusions reached and recommendations for further research. Five appendices include additional data analyses, the students' pre/post skills test, and timing sheets used with students. A 71-item bibliography is attached. (EW)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED290451

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☒ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

TEACHER TRAINING FOR KEYBOARDING INSTRUCTION --GRADES 4-8: A RESEARCHED AND FIELD TESTED INSERVICE MODEL

by

John W. Stoecker

IR012999

BEST COPY AVAILABLE

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

John W. Stoecker

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

INTRODUCTION

Humans have always found it necessary to learn new skills to use the current predominant means of sharing knowledge. In early societies, the elders passed on a community's knowledge to others, who had to learn how to memorize it so they could in turn pass it on (Brembeck 1971). In time, pictorial images on clay tablets or papyrus leaves supplemented oral traditions, and finally written symbols brought uniformity to this transmission of knowledge. Those few people who knew how to read and write the symbols were greatly respected.

Johannes Gutenberg's invention of the printing press with movable type in the 1500's was the next major communications turning point in human history. It was an inexpensive way to spread information quickly, but people had to master complex reading and writing skills in order to take advantage of it (Triebe 1981).

The next major technological advancement in information dissemination on paper after the development of the printing press was the invention of the typewriter about 1876. Those individuals who developed the skill of quick and efficient typing became a valuable part of the work force in business

and industry. The development of typing added a high degree of complexity to human life, since it allowed a tremendous amount of information to be transmitted easily. During the first seventy years of the twentieth century, four new communication technologies evolved--radio, film, records, and television. They greatly enhanced information transmission because they were readily available to the general public and required minimal reception and interpretation skills (although they required the learning of complex sending skills).

In order to accommodate the continually increasing information in recent years, humans have had to develop more resources outside themse'ves to PROCESS all that their minds created. The development of the integrated circuit in the mid 60's was a major breakthrough in information processing. Spencer (1983) describes how the circuitry is miniaturized through Very Large Scale Intergration (VLSI), a process that allows circuits containing tens of thousands of components to be densely packed on a single silicon chip.

The integrated circuit led to the development of 12 information processing technologies in addition to radio, film, records, and television, that have potential for the learner (Coats 1984). These technologies are: digital telephone lines, microcomputers, computer storage, information services, teletext, videodisks, calculators,

video cassette recorders, teleconferencing, slow-scan TV with satellite dish, morphemene generators, and speech compressors. The first six of these commonly use a standard keyboard. The microcomputer is perhaps the most important of these six for K-12 Students. As microcomputers become smaller, better, and more affordable, more K-12 schools are purchasing them for class room use.

The microcomputer requires more interactive skills than television, films, and records, and so school use of microcomputer implies some preparatory training. The microcomputer does not generally process information until it has received an instruction to do so. The process of passing human thoughts and ideas into the microcomputer is commonly referred to as interfacing, where two independent systems meet and communicate with each other.

As microcomputers become more common in educational settings, especially in the elementary grades, interfacing becomes a major issue. But the true potential of the computer in education is limited when students lack the skills to interact efficiently. Seven devices other than the keyboard have been developed to allow interfacing with the microcomputer. They are the light pen, optical reader, touch-sensitive screen, the joy stick, voice recognition, touch pad, and the 'mouse.' These devices will be discussed in some detail in the review of literature. While these

seven devices are all useful and fulfill a purpose in certain situations, they need extensive development to be practical on a large scale in education. The keyboard is currently considered the primary interfacing device--to get information from the mind to the microchips. It has a history of acceptance that spans over 100 years, and instruction on how to use it is readily available. Typically, instruction on the efficient use of the keyboard is not introduced until the ninth grade. There the focus is on vocational uses, and the student's immediate needs are seldom fully addressed. As the microcomputer continues to play an increasing role in the elementary classroom, touch-typing instruction will also become more important to gain greater efficiency of computer use and to discourage improper typing techniques that can later become a great hindrance. For these reasons elementary educators need to consider how to bring touch-typing to their students.

Statement of the Problem

This study assessed the status of touch-typing in school districts in Oregon and Washington, and developed and field tested a comprehensive training program that prepares elementary teachers to teach touch-typing skills to elementary students.

Rationale

The American K-12 schools own approximately 350,000 microcomputers as of April, 1984 (Bork, 1984). The number of microcomputers in schools has been doubling annually and that trend will likely continue a few more years. Since the cost of microcomputers is continually dropping, many parents are also buying them for home use.

The increasing use of microcomputers in schools and the lack of appropriate keyboarding skills by students concerns some educators. The inefficiency of improper keystroking techniques that many students display creates current and continuing problems. In an educational setting, microcomputer use occurs at two levels - simple and sophisticated. The simple level involves microcomputer software that reinforces concepts being taught by the teacher. These programs require only short responses by the student using one or two finger strokes. The sophisticated level usually involves computer application programs that allow the microcomputer to be used as a tool (e.g. word processing, data base management). It is at this level of use that the student requires a greater skill level of touch-typing to perform efficiently.

Several researchers (Rauch & Yanke, 1982; Craighead & Switzer, 1983; Ownby & Perreault, 1983) indicate that without typing skills valuable time is lost searching for

keys while other students are waiting to use the microcomputers. The capabilities of the microcomputer are lost if the information it needs trickles in at 3-5 words per minute.

Mclean (1984) and Kisner (1984) define keyboarding as the activity of entering alphanumeric information into a microcomputer. But, the impact of microcomputers at the elementary level requires that the entering of alphanumeric information be more efficient and be done at a higher rate than the term - keyboarding as defined above, suggests.

A new phrase--touch-typing skills for elementary students--is a better description of what is expected of elementary students using computer or typewriter keyboards. The phrase is defined as a process of knowing the keys well enough to be able to touch-type at a reasonable rate all letters of the alphabet, the period and comma keys, and the three major function keys (the return key, space bar, and shift key).

Since touch-typing is an important aspect of efficient computer use, the question becomes-What are school districts who are concerned about efficient microcomputer use doing to teach touch-typing skills to elementary students? How are students taught touch-typing skills? Who instructs the students to use the touch-typing skills correctly? The literature that is discussed in Chapter II gives

ample support to the notion that elementary students using computers should have some formal instruction in touch typing to make more efficient use of their time and the equipment.

What seems to be lacking is information on how best to prepare elementary teachers to teach these skills. A search of the literature produced only one article that addressed the issue of preparing elementary teachers to teach touch-typing written by Sormunen (1984). Several articles did describe individual efforts in the elementary classroom. None provided any data on the effectiveness of the methods used. The lack of research in this field prompted this study.

This study investigated the growing belief that it is appropriate and useful to teach touch typing at the elementary level. It used a questionnaire to analyze the status of touch-typing at the elementary school level in selected Washington and Oregon districts. The study also included the development and field testing of a training manual that school districts and teacher education programs can use to prepare individuals to teach touch- typing skills in the elementary grades.

School districts were surveyed to determine the following: (a) whether the number of computers or typewriters used at the elementary level was sufficient to

consider touch typing instruction for students, (b) what methods of typing instruction were being offered to students, and (c) what method of instruction the district preferred for teaching the touch typing skills to elementary students.

Craighead and Switzer (1983), Schmidt (1983), Troutner (1983), and Sandberg-Diment (1984) among others state that touch-typing can be taught effectively by a software tutorial program, and this belief partially prompted the development of this study. My own evaluation of many of these tutorial programs found that these programs generally lack recommended teaching methods such as: a questionable sequence of teaching the keys, a lack of balanced hand drills, improper eye movements, and too many distractions, that created tension and frustration in students.

Andrews (1984) supports this observation. He studied the use of five popular typing tutorial programs and found that non-typists still used two fingers to search for the correct keys. He indicated that none of the programs could replace touch-typing instruction by an educator.

Lambrecht and Pullis (1983) also evaluated often-used typing tutorial programs and found severe omissions such as proper finger-key associations, meaningful key combinations, and enough encouragement to use the correct fingers.

A major factor in teaching a psychomotor skill such as touch-typing is observing the performance and making the appropriate correction. Robinson (1982) stressed the limitations of computer-assisted turorial packages for teaching students:

> The microcomputer cannot see, so it cannot observe the student at work and make appropriate suggestions for improved learning behavior. Only a human can do that. The microcomputer cannot hear; therefore, it cannot answer the student's call for help. Only a human can do that. The microcomputer cannot "feel" so it cannot assess and accommodate itself to learning problems that derive from the motives, emotions, and attitudes in the "human conditions." Only a human can do that. Thus, the microcomputer is a teaching/learning "tool." It cannot replace a well-prepared, interesting, and interested teacher. (p 231)

The workshops in this study were conducted with two simple goals: (a) to help interested educators become "well prepared" to teach touch-typing to elementary students, and (b) to ascertain whether the trainer's manual used during the one-day workshop could provide enough knowledge and skills to assure that educators would be successful in giving such instruction.

Study Groups

This study used three different groups: (a) 217 central office people, principally elementary curriculum supervisors from Washington and Oregon who received the questionnaire (Appendix A), (b) 37 educators from 14 school districts who were taught to teach touch-typing to elementary students

and (c) 135 students (grades 3-8) who received four weeks of touch-typing instruction from these educators.

Procedures of the Study

Chapter III contains a complete presentation of the study design. The following summary provides a general overview of the development of the study.

1. A questionnaire) was developed and mailed to a random sample of 409 individuals who were responsible for elementary curriculum supervision in Oregon and Washington. Two-hundred and seventeen (54%) questionnaires were returned). Generally, It assessed:
   a. the extent and nature of current touch-typing instruction in elementary schools,
   b. Current beliefs about the importance of touch-typing in elementary schools, and
   c. current plans to include or adapt touch-typing instruction.
2. A trainer's manual was developed for an inservice program that prepares teachers to teach touch-typing to elementary students. The manual is based on the most recent research in touch-typing, psychomoter skill development, and currently effective inservice models. It contains

detailed information on the organization of such a workshop, and the strategies to be used during the workshop. The trainer's manual also contains 19 detailed lesson plans that the teacher can use to teach elementary touch-typing to elementary students.

3. 37 teachers attended a 6-hour workshop on Teaching Touch-Typing. Before coming to the workshop, the participants made arrangements to teach a group of students immediately following the workshop. Participants provided pre/post evaluation information about the workshop that is analyzed and reported on page 46.
4. Teachers collected pre/post data from the students they taught. The analysis of this information is also reported on page 46.

Definition of Terms

Touch-Typing Skills: The process of knowing the keys well enough to be able to touch-type (at a reasonable rate) all letters of the alphabet, the period and comma keys, and the three major function keys (the return key, space bar, and shift key). The literature in this field often uses the term keyboarding to refer to touch-typing on a computer. As indicated on page 6,

that term seemed inappropriate for this study, hence, the more commonly understood term, touch-typing, will be used throughout the study.

Trainer's Manual: A manual developed and field-tested for this study that shows how to conduct a workshop to train interested educators to teach touch-typing. It also contains the 19 lesson plans the educator would use with these students.

Pre/Post Keyboard Knowledge/Skill Test: An instrument developed for this study to assess whether the participants attending the touch-typing workshop experienced a change in their knowledge/skill level ability to teach touch-typing to elementary students.

Software Typing Tutorials: Any computer program that teaches individuals keyboarding skills.

Word Processing: The use of a special computer program to format written materials. The text is typed into the computer where it is stored in the computer's memory. The typed material can be rearranged, changed, deleted, and additional information inserted. The finished product can be stored on a disk for future use, or printed out on paper.

FINDINGS

This study assessed the status of touch-typing in Oregon and Washington school districts, and developed and field tested a comprehensive training program that prepares elementary teachers to teach touch-typing to students.

A questionnaire, mailed to 409 school district elementary curriculum supervisors, sought information on the status of touch-typing in their elementary schools. The first part of this chapter reports the findings of this survey.

The second part of this chapter reports the pre/post tests and workshop evaluations of 37 educators who attended workshops that prepared them to teach touch-typing to elementary students.

The third part of this chapter reports the level of effectiveness of the touch-typing program the 37 teachers taught to 136 elementary students.

School District Survey

Demographics

Table 1 presents data on the 112 small and 105 large school districts that responded to the questionnaire. An examination of the data and Table 1 suggests that the typical

responding district had; (1) a K-6 elementary pattern with 4.2 schools (S.D. 7.9) averaging 274 students, (2) a 7-8 mid/junior high school pattern of 4.0 schools averaging 343 students, (3) a 9-12 senior high school pattern of 1.6 schools averaging 1007 students. Some of these means were strongly affected by district patterns. For example 55 of the 124 districts with a K-6 elementary school pattern had only one school, and one district had 65 schools.

TABLE 1. School Size Patterns

Grade Levels	Number of School Districts	Number of Schools by Grade Levels	Mean Number of Schools By Districts	Mean Number of Students per School
		Elementary		
K-4	3	4	1.35	280
K-5	54	204	3.78	344
K-6	124	584	4.20	274
K-8	36	49	1.36	248
Total	217	841		
		Mid/JH School		
5-8	2	2	1.00	327
6-8	59	98	2.66	404
7-8	71	84	4.00	343
7-9	21	64	3.04	668
Total	153	248		
		Senior High School		
9-12	141	175	1.24	582
10-12	23	37	1.61	1007
Total	164	212		

Current Status of Touch-Typing

Computers in Elementary Schools

Table 2 indicates the number of microcomputers in the 217 districts' elementary schools. The table suggests that K-4/K-5/K-6 arrangements of schools had the most microcomputers per school (mean, 6.9), about two more than the K-8 schools. The K-8 pattern tends to be more common in smaller districts, or in elementary school districts.

Introduction of Touch-Typing

Table 3 reports that 52.9 percent of the school districts in this study assigned the introduction of formal touch-typing instruction to the grade 9-10 curriculum. Since typing is common in the secondary curriculum, it is possible that some of the 20.3 percent of the districts who did not respond to this item were elementary districts who felt this question did not apply to them. The respondents also reported a wide range of grades that offered informal touch-typing instruction. This centered in grades 3-5, where 38 percent of the districts reported informal instruction (16.6% at the grade 4 level). Further, 56.2 percent of the 217 respondents thought that the grade 3-5 level, preferably grade 4 (29.5%), was the most appropriate grade level. Only about 6.9 percent thought that grades

9-10, where introduction to touch-typing is generally assigned was the most appropriate. Thus, a majority of the educators responsible for the elementary curriculum in Oregon and Washington schools believe that the introduction of touch-typing is most appropriate at the intermediate grades.

TABLE 2. Number of Computers in the Elementary Schools

Grade Level	Number of Schools	Number of Computers	Mean Number per School
K-4	4	25	6.25
K-5	264	1426	6.94
K-6	584	3727	6.38
K-8	49	210	4.10
TOTAL	841	5369	6.38

TABLE 3. Touch-Typing Instruction by Grade Level

Grade Level	Formally Taught		Informally Taught		Most Appropriate Grade Level	
	N	%	N	%	N	%
K	1	.8	N	5.5	3	1.4
1	1	.5	11	5.1	6	2.8
2	1	.5	7	3.2	15	6.9
3	6	3.5	28	12.9	35	16.1
4	9	4.1	36	16.6	64	29.5
5	3	1.4	20	9.2	23	10.6
6	6	2.8	8	3.7	15	6.9
7	19	8.8	17	7.8	24	11.1
8	11	5.1	3	1.4	7	3.2
9	83	38.2	13	6.0	15	6.9
10	32	14.7	2	.9	3	1.4
11	1	.5	1	.5		
12			1	.5		
N/A	44	20.3	58	26.7	7	3.2
TOTAL	217	100.0	217	100.0	217	100.0

Organization of Touch-Typing Classes

Table 4 reports on 22 districts where formal touch-typing instruction is currently taught to elementary students. A typical instructional pattern appears to be a six week program with 30 minute sessions meeting 3 times a week, similar to the program proposed in this study.

TABLE 4. Formal Elementary School Touch-Typing Program Patterns in 22 Districts *

N = 217	Range	Mean	S.D.
Class Sessions in Program	1-60	18.7	14.7
Number of Sessions per Week	1-5	3.3	1.7
Number of Minutes per Session	15-55	33.0	12.8

* 195 Districts (90%) reported no formal elementary touch-typing program

Methods of Touch-Typing Instruction

The instructional format and the materials used for elementary touch-typing instruction varied among the 22 districts that provide touch-typing instructions. Table 5 reports that 63.6 percent of these 22 districts use a teacher/software tutorial combination for instruction.

The three software tutorial programs used most often were: Master Type, Typing Tutor, and PAWS. It is possible that the heavy reliance on software tutorials is intended to support elementary teachers who lack sufficient training to teach touch-typing.

TABLE 5. Instructional Format/Materials for Elementary School Touch-Typing Program in 22 Districts

Format	(N=22)	(100%)
Teacher/Software Combination	14	63.6
Trained Elementary Teacher	4	18.2
Business Education Teacher	2	9.1
Volunteers	1	4.5
School Aides	1	4.5

Materials	(N=22)	(100%)
Master Type	6	27.2
Typing Tutor	5	22.7
Paws	4	18.2
Bond-Shean Program	2	9.1
Hawaii Program	2	9.1
South Western	1	4.5
MECC	1	4.5
District Produced	1	4.5

Keyboards Used in Instruction

An examination of Table 6 clearly indicates that the computer is the current dominant vehicle for teaching touch-typing in the 22 districts, with 18 of the 22 districts using it, and 11 over 60 percent of the time. Electric typewriters are used 80-100 percent of the time in 4 districts. Further, only 5 districts use manual typewriters for only a small part of their program. It appears from questionnaire responses and comments that the 9 districts that use paper keyboards use them mostly for introductory activities.

Importance of Touch-Typing in Elementary Schools

Table 7 reports how the 217 elementary curriculum supervisors used the following scale to rated their views on the importance of touch-typing:

> How important is it to teach elementary students touch-typing? (Circle one number on the scale).
>
> Very Important 1 2 3 4 5 Not Important

Forty-four percent of the respondents rated the importance of elementary school touch-typing 1 or 2 on the scale. More large districts (32.4%) than small districts (18.6%) rated it this high. Overall, though, the Pearson Chi-Square Test found no significant difference in the pattern of response. The data communicate a diversity of views among the respondents, rather than agreement.

TABLE 6. Types of Keyboards Used in Elementary Touch-Typing Instruction in 22 Districts

Percent of Use	Computers	Electric Typewriters	Paper Keyboards	Manual Typewriters
		Number of Districts		
1-19	2	4	5	4
20-39	2	1	3	1
40-59	3	0	1	0
60-79	4	2	0	0
80-100	7	4	0	0
N	18	11	9	5

TABLE 7. Elementary Curriculum Supervisor's Perception of the Importance of Teaching Touch-Typing to Elementary Students

Level of Importance Scale		Total	Districts Large *	Small *
Very Important	1	15.7%	8.8%	6.9%
	2	28.2%	16.6%	11.6%
	3	25.5%	10.2%	15.3%
	4	13.95	7.4%	6.5%
Not Important	5	16.7%	5.6%	11.1%
	N	217	105	112

* Chi-Square 8.62 - NS .05

Plans for Offering Touch-Typing

Table 8 reports the number of districts planning to institute a touch-typing program for elementary schools. About twice as many large districts (32%) as small districts (18%) are planning to teach touch-typing at the elementary level in the near future. Overall, this is 25 percent of the 217 respondents. The Pearson Chi-Square test found: (a) no significant difference between a district's student/computer ratio and their plans to institute an elementary touch-typing program, or (b) between the size of a district and its plans to offer elementary touch-typing.

TABLE 8. Districts Planning to Institute a Touch-Typing Program for Elementary Schools

Institute a Touch-Typing Program	Districts		
	Large	Small	Total
N = 216	105	112	
YES	32.4%	18.0%	25%
NO	59.0%	66.7%	63%
No Response	8.6%	15.3%	12%

Chi-Square 4.7 - NS .05

Resources for Training

The elementary curriculum supervisors were asked to use the following scale to rate their perception of the current typing teachers' willingness and ability to train elementary teachers to teach touch-typing:

Enthusiastic	1	2	3	4	5	Unwilling
Competent to train elementary teachers	1	2	3	4	5	Not competent to train elementary teachers

Fifty-four percent of the respondents rated their districts' typing teachers 1 or 2 on the enthusiastic side of the scale concerning the willingness to train elementary teachers. Seventy-four per cent of the respondents rated their typing teachers 1 or 2 on their competence to train elementary teachers. Although the supervisors thought their secondary typing teachers were competent and willing to train elementary teachers, it is not certain that their respective districts would be willing to provide the resources (e.g., money, released time) for such an inservice program.

Instructional Preference

Table 9 reports the respondents' instructional preference for elementary touch-typing programs. Fifty-five percent of the districts reporting preferred a trained elementary teacher as their first choice to teach touch-typing to elementary students. An examination of the

weighted ranked data suggests that a trained aide was the second choice, volunteers the 3rd choice, and business education teacher the 4th choice.

TABLE 9. Elementary Curriculum Supervisors' Instructional Preference for Elementary Touch-Typing Programs

Preference	N	High 1	2	3	Low 4	No Response
		Percent of Districts				
Trained Elem Teacher	215	55%	15%	10%	3%	17%
Trained Aide	216	17%	22%	24%	17%	20%
Volunteer	215	10%	20%	24%	23%	24%
Business Teacher	215	12%	19%	15%	29%	24%

This ranking is somewhat surprising in light of (1) the belief commonly expressed in the literature that only business teachers are qualified to teach touch-typing skills (Dickey-Olson, 1982; Holmquist, 1983; Kisner, 1984), and (2) the response pattern to the questionnaire item discussed immediately above in which the respondents indicated that their district's business teacher was competent and willing to assist in the touch-typing program.

Important Factors in Touch-Typing

Table 10 reports how the respondents ranked the four most important of eight factors that could be included in an elementary touch-typing instructional program. About 50 percent of the respondents selected key locations, typing accurately, and proper keystroking among the four most important factors, and about 40 percent included--to type the alphabet.

Careful examination of the introductory strategies in the standard textbooks on touch-typing (e.g. Gregg, South Western) suggests that they place most emphasis on good posture, key location, proper key stroking, and acceptable rate. Thus, table 10 suggests that the elementary supervisors agreed with the texts in 2 of the 4 top factors, but placed the other two in positions 7 and 8.

TABLE 10. Elementary Curriculum Supervisors' Rating Eight Important Factors in Elementary Touch-Typing Programs

Factors	N = 217	Response	%	Textbook Emphasis
1.	To Know Key Locations	192	88.5	*
2.	To Type Accurately	130	59.9	
3.	To Use Proper Keystroking	110	50.7	*
4.	To Type the Alphabet	86	39.6	
5.	To Compose on the Keyboard	82	33.8	
6.	To Type the Numbers	67	30.9	
7.	To Type at an Acceptable Rate	54	24.9	*
8.	To Use Good Posture	45	20.7	*

Touch-Typing Workshop for Elementary Teachers

The need for a touch-typing inservice program becomes evident when district elementary supervisors clearly prefer that trained elementary teachers, aides, or volunteers conduct their districts' elementary touch-typing program, rather than their districts' business education teachers. The second part of this study developed and field tested a touch-typing training program.

Pre/Post Workshop Skill/Knowledge Inventory

Thirty-seven educators attended a one-day touch-typing workshop that taught them how to teach touch-typing skills to elementary students. The participants took a 15-item pre-workshop Knowledge/Skill inventory (Appendix E) covering four categories (class room preparation, typing techniques, reinforcement, and demonstration.) An expanded inventory (Appendix F) was administered again two weeks after the workshop. Twenty-five educators returned all the required information. The 25 pretest scores ranged from 3-10 correct answers with a mean score of 8 (sd 1.7). The posttest scores ranged from 7-14 with a mean score of 11.6 (sd 1.4). The t-score of 7.8 (sig .05) indicates a significant improvement in their knowledge/skill level. Appendix I Contains individual scoring patterns.

Evaluating Workshop Content

A workshop evaluation form (Appendix G) was mailed to the participants two weeks after the conclusion of the workshop (after they had an opportunity to begin applying the workshop training). The evaluation asked the participants to use a 5-point scale (5-high) to rate 6 statements that related to the workshop content (e.g., met needs, content, clear objectives.) Thus, total scores could range from 6-30. The scores ranged from 16-30 with a mean score of 25.6 (sd 3.3). Appendix J contains individual evaluation patterns.

The workshop evaluation also asked the respondents to use the same 5-point scale to rate the instructor's ability on 10 factors (e.g. teaching strategies, concern, enthusiasm, knowledge). Thus, total scores could range from 10-50. The range for these scores was 33-50 with a mean score of 44.4 (sd 8.2). Appendix J contains individual evaluation patterns.

Evaluating the Effectiveness of the Touch-Typing Program

The workshop (post 2-week) evaluation also asked the participants to respond to the following item describing the effectiveness of the touch-typing program up to that point in their instructional cycle.

_____ Number of lessons taught up to this point.

Rate the effectiveness of this touch-typing program by placing a circle around one number.

Very Effective 5 4 3 2 1 Not Effective

The ratings from the 24 respondents ranged from 2-5 (5-high) with a mean rating of 4.1 (sd .9). Twenty-two respondents ranked the touch-typing program in the top two effectiveness ratings.

Confidence to Teach Touch-Typing

Three self-reports were taken to determine the participants' level of confidence to teach touch-typing - (a) at the beginning of the touch-typing workshop, (b) at the midpoint of the four-week instructional cycle, and (c) when they finished the 19-lesson program. The question asked was:

> "How comfortable are you with your skill level to teach touch-typing to elementary students?" (Circle one number)

Very Comfortable 7 6 5 4 3 2 1 Not Comfortable

The pretest scores ranged from 0-7 with a mean of 3.0 (sd 1.6). The midpoint scores ranged from 2-7 with a mean of 4.2 (sd 1.3). The posttest scores ranged from 2-7 with a mean of 4.7 (sd 1.0). A One-Way Repeated Measures Test indicated a significant increase in scores between the pre/post test means at the .01 level. The response pattern

suggests that participants reached a plateau level at about midpoint, and maintained it. On the pretest, 21 percent of the respondents rated their skill level at teaching touch-typing at 6 or 7 in the scale as compared to 67 precent in the posttest.

Commercial Touch-Typing Tutorials

On the Knowledge/Skill posttest (Appendix F) the participants were asked to indicate their experience with commercial touch-typing tutorials and to compare them with the program used in this study. Seven of the 25 respondents had prior experience with typing tutorials. Five of these seven rated this study's touch-typing program 6 or 7 on a seven point (high) scale.

Teaching Touch-Typing to Elementary Students

After the educators finished the 1-day workshop, they went back to their districts and began a 4-week instructional program.

The teachers administered a pretest (Appendix K to students who had volunteered to be part of the 4-week instructional program, to determine their current touch-typing skill level. The pretest has three parts, (a) a Keyboard Identification Chart, (b) a paragraph for timed writings, and (c) a personal information section.

Student Demographic Data

Twenty-five educators returned the personal data section on 83 of the 133 student pretests given. The data from the personal information section indicate that the students' mean age was 10.5 years, and their mean grade level was 4.9. Thirty-seven percent of the students had home access to a typewriter, and 29 percent had access to a computer. Only 3.6 percent of the students in this study had previous formal typing instruction of some kind. Twenty-four percent of the students had taken piano lessons. As might be expected in a volunteer program, 69 percent of the students indicated a high interest in learning to touch-type.

Keyboard Chart Pre/Post Results

The teachers asked the students to fill in the keys they knew on a paper keyboard chart before and after four weeks of instruction. Table 11 reports the results of these pre/post tests. The typical student knew about 9 of the 30 keys before instruction and 24 after completing instruction. A t-test of the dependent means score of 16.5 (df=130) indicated a significant increase (sig .01) in the number of keys recognized.

TABLE 11. Results From the Student Pre-Post Keyboard Chart Tests

Number of Keys Correct	Pretest N	%	Posttest N	%
28-30	2	1.5	52	38.7
25-27	5	3.8	25	18.7
22-24	1	.8	13	9.7
19-21	4	3.0	13	9.7
16-18	6	4.5	9	6.7
13-15	17	12.8	7	5.2
10-12	20	15.1	8	6.0
7-9	22	16.5	4	2.9
4-6	17	12.8		
1-3	25	18.8	2	2.2
0	14	10.5	0	
TOTAL	133	100.0	133	100.0
MEAN	8.97		23.57	
S.D.	7.80		7.29	

TABLE 12. Results of The Pre-Post 5-Minute Timed Writings

Gross Words Typed In 5-Minutes *	Pretest N	Pretest %	Posttest N	Posttest %
238	1	.8		
223			1	.7
111-120			4	2.9
101-110	3	2.4	3	2.2
91-100	1	.8	4	2.8
81-90	2	1.6	6	4.3
71-80	6	4.7	17	12.5
61-70	10	7.8	28	20.8
51-60	12	9.3	27	17.8
41-50	30	22.7	26	19.3
31-40	31	23.5	15	11.0
21-30	24	18.2	5	3.7
10-20	12	9.2	2	1.4
N	135	100.0	135	100.0
MEAN	44.7		61.3	
S.D.	26.2		25.5	

t = 11.6, Sig .001

* Total number of words typed in five minutes

reports the results of these pre/post tests. The mean for gross words typed in 5 minutes during the pretest was 44.7 (sd 26.2), and 61.3 for the posttest (sd 25.5). A t-test for dependent means indicated a significant increase (sig .01) in the number of gross words typed in 5 minutes. About 68 percent of the students typed more than 80 words during the 5-minute pretest timing, and 12 percent typed more than 80 words during the posttest timing.

Pre/Post 1-Minute Net Words Results

The teachers also administered two 1-minute timings every day during the 4-week period. The errors were subtracted from gross words typed per minute and the net words per minute (NWPM) score for that day was recorded on the Timing Sheet (Appendix L). At the end of the four weeks of instruction, the best 1-minute timings from Lesson 2 and 28 were compared to arrive at a comparison that would be similar to a pre/post test. Table 13 reports the result of this comparison. The pretest mean was 11.5 (sd 4.5) NWPM and the posttest mean was 17.6 (sd 5.5), a significant increase (sig .01) in NWPM typed.

TABLE 13. Results of the Pre-Post 1-Minute Timed Writings

Net Words Typed in 1-Minute *	Pretest N	Pretest %	Posttest N	Posttest %
36-40			1	.7
31-35			1	.7
26-30			6	4.4
21-25	2	1.5	29	21.7
16-20	27	20.3	50	37.6
11-15	40	30.0	35	26.3
6-10	56	42.1	11	8.3
0-5	7	5.3		
TOTAL	133	100.0	133	100.0
MEAN	11.5		17.7	
S.D.	4.5		5.5	
t = 14.3, Sig .001				

* The gross number of words typed per minute minus the number of errors.

TABLE 14. 1-Minute Pre-Post Touch-Typing Rate for Students in Grades 3-8

Grade Level	N	Pretest		Posttest		NWPM Gain
		Mean NWPM *	S.D.	Mean NWPM	S.D.	
3	23	7.17	3.17	15.65	5.45	8.48
4	39	11.15	3.31	16.13	4.16	4.98
5	28	13.93	4.49	18.24	6.01	4.31
6	20	11.85	3.70	19.90	5.20	8.05
7	9	12.38	5.71	19.13	5.13	6.75
8	14	13.69	4.50	19.36	6.73	5.67
Total	133					

* NWPM - Gross number of words typed minus the number of errors

One-Minute Typing Means for Grades 3-8

Table 14 reports the means for net words per 1-minute timings by grade level 3-8. The pattern of response shows that the grade 4-8 students means were close to each other at the pretest level (11-14 NWPM), 4+ words per minute above the grade 3 students. All grades had improved from 4-8 words per minute by the posttest level to a net rate between 15-20 words per minute, after 4 weeks of instruction - certainly an acceptable level considering the time and effort invested in the program.

5-Minute Timing Means for Grades 3-8

Table 15 summarizes the means for 5-minute timings for grades 3-8. The pattern is similar to that of the 1-minute timed tests when one considers that people tend to type more words per minute in a shorter timing than in a longer test.

An examination of the table reveals the pre/post test means for grades 7 and 8 were close to each other and so were the means for grades 4, 5, and 6. Grade 3 made substantial gains (24.6 gross words) compared to other grade level gains. Tables 14 and 15 suggest that grades 4-6 start basically at the same level and progress to a similar level of performance.

TABLE 15. 5-Minute Pre/Post Touch-typing Rate for Students in Grades 3-8

Grade Level	N	Pretest		Posttest		GW Gain
		Mean GW*	S.D.	Mean GW	S.D.	
3	23	27.74	12.56	52.35	18.68	24.61
4	39	39.00	12.00	54.31	20.40	15.34
5	28	40.56	14.18	59.17	6.01	18.61
6	20	43.60	17.69	63.35	18.00	19.75
7	9	74.89	5.71	85.56	5.13	10.67
8	14	78.29	20.11	78.71	23.79	.42
N	133					

* GWPM - Total number of words typed in 5 minutes

A Repeated Measures Test indicated no significant relationship between students' post words-per-minute scores and prior experience with piano lessons or typing lessons.

Estimate of Proper Keystroking

On the post Knowledge/Skill Inventory the educators were asked to estimate the precent of correct keystroking by students as they were taking the pretest. The same question was ask of the educators on the Final Report about the students' posttest. Twenty of the 25 educators reported that their students were using proper keystroking less than 20 percent of the time during the pretest. Twenty of the 25 educators reported that their students were using proper keystroking more than 70 percent of the time during the posttest. Appendix M gives the individual responses.

Summary

A district-wide elementary touch-typing questionnaire was mailed to 409 elementary curriculum supervisors in Oregon and Washington. Supervisors from 112 small districts and 105 large districts returned the questionnaire for a response rate of 54 precent. The results of the district touch-typing survey suggests a growing awareness of the need for more efficient use of the microcomputer through the improvement of student typing skills. Forty-four percent of

SUMMARY, CONCLUSIONS, AND RECOMMENDATION

Summary of the Study

The means for compiling information and transmitting it through written form became more refined as the process passed from clay tablets to Gutenberg's printing press. The invention of the typewriter about 1876 not only helped standardize written forms of communication but it also allowed for a tremendous amount of information to be transmitted easily. The more recent development of other communication media, such as telegraph, radio, film projectors, phonographs, telephone, and television greatly enhanced the quantity and quality of disseminated information.

The increasing amounts of information an increasingly complex culture engendered required new and even faster ways of processing it. Information processing experienced a major breakthrough in the mid 1960's with the development of the integrated circuit. The integrated circuit led to the development of at least a dozen technologies to accelerate information processing. Of these, the microcomputer seems to hold the most promise for K-12 schools.

The microcomputer is an interactive device that requires instructions before it processes information.

Passing human thoughts and ideas into the microcomputer's memory is referred to as interfacing, a place where two independent systems meet and communicate with each other. As microcomputers become more common in schools, efficient interfacing becomes more important. Of the eight interfacing devices that have been developed to interact with the microcomputer, the keyboard is the most widely available input device.

Many educators are concerned that elementary students lack appropriate keyboarding skills at a time when an increasing number of microcomputers are appearing in the classroom. As students with inadequate typing skills search for the right keys, they use valuable microcomputer time which limits the use that other students can make of the equipment. The effectiveness of the microcomputer is lost when information is typed in at a rate that is slower than the student can write by hand.

A major shift in how microcomputers are being used requires a new approach to keyboarding. The literature refers to keyboarding as simply the activity of entering alphanumeric information into a microcomputer. Touch-typing for elementary students is a better description of what is needed as elementary students begin to use more application software. Touch-typing for elementary students can be defined as the process of learning proper key stroking well

enough to be able to touch-type (at a reasonable rate) all letters of the alphabet, the period and comma keys, and the three major function keys (the return key, space bar, and shift key).

Software typing tutorials are being used by some teachers to help students become more proficient with the keyboard. Several authors point out weaknesses in the teaching strategies in some of the tutorials. Others make a strong case for elementary teachers providing the instruction.

What seems to be lacking at the present time is how best to prepare elementary educators to be able to teach these skills to their students.

The review of literature in Chapter II focused on four categories: (a) commentary and research on microcomputer input devices, (b) touch-typing in elementary schools, (c) the appropriate grade levels for introducing touch-typing, and (d) strategies for bringing touch-typing into the elementary schools.

Although the literature identifies seven microcomputer input devices other than the keyboard, the keyboard currently dominates school microcomputer use. Some of the other input devices have made microcomputers available to handicapped students (e.g. voice recognition for paralyzed students, optical scanners for blind students), but these

input technologies are still in the beginning stages of development and are used in conjunction with the keyboard, not in place of it. The keyboard will probably remain the most common and best developed interface for K-12 schools in the foreseeable future.

In order to use the keyboard effectively, students need to develop an adequate level of touch-typing skill. The literature suggests the following reasons as part of the growing support for teaching touch-typing skills at the elementary level: (a) a trend away from drill and practice toward using the microcomputer as a production tool, (b) a loss of valuable time as students search for keys while others are waiting to use the computers, and (c) an increasing concern about improper keystroking patterns in students that could be difficult to correct.

Recent articles (e.g. Holmquist, 1983; Wetzel, 1985) suggest grades 3-6 for the introduction of touch-typing skills. The literature is best summarized by Kisner (1984) who stated that keyboarding instruction should occur right before the student begins to use the microcomputer as a tool, regardless of the grade level.

A close examination of the major research studies involving the use of the keyboard dating from 1932 to the

1984 would support Kisner's statement. Ten separate studies cited in chapter II successfully taught K-7 students to type (Figure 1). Even though all K-7 grade levels were represented in these studies, instruction seemed to center in grade 4.

To determine when to began a touch-typing program, Wetzel (1985) suggests that a district ask these four questions: (a) which academic area needs to be improved? (b) will the microcomputer improve the area? (c) Will students repeatedly use the microcomputer during this academic improvement? and (d) is enough hardware available? A touch-typing program is needed if the answer is yes to all four questions.

Once the decision is made to implement a touch-typing program, the literature reports that four options are available for delivering instruction: (a) elementary educators trained to teach touch-typing, (b) secondary business teachers, (c) software tutorials, and (d) teams of business and elementary educators. The literature suggests that the elementary educator trained to teach touch-typing is the most appropriate person to provide this instruction.

When elementary educators are trained through an inservice program to teach touch-typing, the inservice model should contain two components to assure its success: (a) a system to help teachers implement the touch-typing

instruction at the classroom level, and (b) a process to measure the effect of the inservice on student achievement.

This study evolved out of the growing belief that the increasing use of the microcomputers in elementary schools requires a more efficient level of keyboarding skills than most elementary students currently possess.

The study assessed the status of touch-typing in school districts in Oregon and Washington, and developed and field tested a comprehensive training program that prepares elementary teachers to teach touch-typing skills to elementary students.

A 14-item touch typing status questionnaire was developed and mailed to a random sample of 409 district supervisors of elementary curriculum in these two states.

Also, a trainer's manual was developed to provide the guidelines for conducting an inservice that prepares elementary educators to teach touch-typing to elementary students. The manual contains 19 detailed lesson plans that teachers can use to teach touch-typing skills to their students.

Thirty-seven educators attended a 1-Day workshop where the manual was used to train them to teach the touch-typing skills. They, in turn, taught touch-typing to a total of 135 students.

Analysis of Data

The questionnaires returned by 217 elementary curriculum supervisors were tabulated and analyzed as follows:

1. Descriptive statistics were used to summarize the response patterns of the supervisors.
2. Large/small district elementary curriculum supervisors' perceptions of the need for touch-typing were compared by using the Pearson Chi-Square Test.
3. Student/computer ratio and the plans to provide touch-typing at the elementary level were determined by using Pearson Product-Moment Correlation coefficients.
4. Large/small districts' plans to provide inservice for touch-typing strategies at the elementary level was compared by using the Chi-Square Test and column percentages.

The information from the Pre/Post Knowledge and Skill evaluations the educators who attended the workshop was analyzed in the following manner:

1. The t-test of dependent means was used to compare participants' (a) knowledge of touch-typing and (b) level of confidence in their ability to teach touch-typing.

2. Post workshop and teaching comments on the effectiveness of the touch-typing workshop were classified and discussed.

The educators administered Pre/Post Keyboard Knowledge/Skill Test to the elementary students in their touch-typing teaching sessions.

1. The t-test for dependent means was used to compare students' pre/post keyboard chart scores, and pre/post words-per-minute scores.
2. The Repeated Means Test was used to compare the words-per-minute gains by students who did or did not have piano lessons or typing lessons.

Findings

A statistical analysis of the touch-typing questionnaires returned by 217 elementary curriculum supervisors revealed the following:

1. A typical responding school district that responded had a K-6 elementary arrangement with 4.2 schools each averaging 274 students and 6.3 computers.
2. About 44 percent of the supervisors rated the importance of touch-typing at the elementary school in the top two ratings on a 5-point scale. No significant differences were found between large/small districts' elementary curriculum supervisors'

ratings of the importance of elementary school touch-typing.

3. Ten percent of the districts were currently offering touch-typing to elementary students, Another 25% of the districts were planning to institute a program soon.
4. Fifty-five percent of the supervisors preferred that an elementary teacher trained in touch-typing instruction teach elementary students the skills.

A statistical analysis of the Pre/Post Knowledge/ Skill inventory, and workshop evaluations returned by 25 educators who attended 1-day teaching touch-typing workshops revealed the following:

5. The 25 educators significantly increased their knowledge, skill, and confidence in teaching touch-typing between the pretest and after the second week of teaching the program.
6. The educators gave high ratings to the content of the workshop.
7. The educators gave very high ratings to the effectiveness of the touch-typing program with their students.

A statistical analysis of the pre/post Knowledge/Skills test results from the 135 elementary students who were taught touch-typing, using mostly microcomputers and some electric

typewriters, by the 25 educators revealed the following:

8. Students significantly increased in key recognition, proper keystroking, net words per minute typed, and gross words typed per 5 minutes after the four week instructional period.
9. The rate they achieved is consistent with the belief that efficient typing is faster than handwriting.

Conclusions and Recommendations

The findings from this study (and from other related studies) suggest that it should no longer be an issue whether or not elementary students can effectively learn touch typing. Research studies with manual and electric typewriters had demonstrated that elementary students possess adequate psychomotor skills and motivation to learn touch-typing skills. Despite this, typing was not generally used or taught at the elementary level probably due to the typewriter's one-dimensional function. It could only type text. The typewriter never acquired the status the microcomputer is currently achieving. The microcomputer reached its present educational status due to the multi-dimensional functions it offers students (e.g. word

processing, drill/practice, simulations, games). The production of strings of text at an acceptable rate is an important prerequisite for many of the microcomputer's other functions.

Schools teach handwriting skills before paragraphing, number manipulations before story problems. It seems reasonable to teach students touch-typing before involving them in the more sophisticated computer applications. It would be ridiculous to limit freeway use to hand-pulled carts and rickshaws. Yet, some educators think nothing of placing a student typing at 4.5 words per minute in front of a $900 microcomputer--that operates in nanoseconds.

Waiting until grade 9 to teach touch-typing was acceptable formerly because it was associated with vocational preparation. The purpose of touch-typing instruction has now been extended to include extensive school and home use of microcomputers. This change should force districts to rethink the appropriate grade level for the introduction of touch-typing. This dissertation argues that it is no longer appropriate to wait until grade 9 to receive formal instruction in touch-typing.

Teaching touch-typing in elementary schools is not meant to be a burdensome addition to the already full elementary curriculum. Most intermediate grade students can acquire adequate touch-typing skills during a 6-8 hour program--30 minutes a day for 5 weeks. This amounts to one

hour for every 100 hours a student spends in elementary grades. This is a small amount of time considering the time wasted during an entire year of microcomputer use without adequate typing skills. Further, elementary educators have not objected to spending 3-5 hours a week for an entire school year teaching handwriting skills.

Another issue has to do with the logistics of locating microcomputers, and scheduling touch-typing instruction. Elementary schools have always created special areas for activities that do not lend themselves to the regular classroom setting. Libraries were created to centralize the storage of books that made them available to all students. Gyms provide the setting for large muscle activity. Special rooms are designated as music rooms or lunch rooms. This study recommends that microcomputer labs be organized in elementary schools. Until elementary schools are able to purchase classroom sets of microcomputers, the microcomputer lab seems the most appropriate solution for using the equipment efficiently and to provide instruction for touch-typing.

The typical elementary school in this study has a K-6 arrangement with 274 students and 6.4 computers. By placing the 6-7 computers in a lab setting, an entire grade level of the typical elementary school could be taught touch-typing by conducting ten 30-minute sessions per day for the first 5 weeks of a school year.

This study suggests that the elementary educator is the best prepared person to teach touch-typing to elementary students for the reasons listed below:

1. They have special training in child development concepts that facilitate the teaching of skill to this age group.
2. They have a greater understanding of intrinsic motivation that applies to this age group.
3. They are part of the daily rhythm of the building because of their association with the staff and students.
4. They are accustomed to teaching beginning or introductory types of subjects or activities.
5. Finally, this study found they can master touch-typing instructional techniques quickly. It is possible that some typing teachers who work with older students could be effective in this role, but it might be more difficult for them to make the age adjustment than it would be for elementary teachers to master typing instructional skills.

It would seem that school districts that want to use elementary personnel to teach touch-typing have 3 options, all of which would require some form of internal or external inservice training.

1. Train every grade 4 teacher to teach the skills to his/her students. The literature plus the survey

conducted in this study suggests the most appropriate grade level to introduce touch-typing is grade 4.

2. Follow the model of the itinerant music or art teacher. Train an elementary educator how to teach touch-typing and have that person go from school to school.
3. Train an aide or volunteer to provide the touch-typing instruction as the teacher assists or teaches the other half of the class in a "back-to-back" arrangement.

Limitations of the Study

1. Random sampling was accomplished only with the subjects for the touch-typing survey. The subjects for the touch-typing workshop and the students who received touch-typing instruction were volunteers who had a high level of interest in these skills.
2. The touch-typing workshop was developed, taught, and field tested by the author.
3. The study was conducted during the last month of the school year, which could have affected the outcome.

Recommendations for Further Research

Several areas of investigation emerged during the study that could be investigated in subsequent studies.

1. The relationship between reading and writing skills and the rate of acquiring touch-typing skills by elementary students.
2. The effect of touch-typing skills on the level of computer use by elementary girls as compared to elementary boys.
3. A replication of this study using different time lengths for student instruction.
4. A replication of this study using larger numbers of students in the classroom setting, and at lower grade levels.
5. A replication of this study using a random selection of teachers to be trained and a random selection of elementary students to be taught.

APPENDIX I

THE PARTICIPANTS' PRE/POST KNOWLEDGE/SKILL INVENTORY SCORES

PARTICIPANTS' PRE/POST SKILL AND KNOWLEDGE INVENTORY OF TOUCH-TYPING

NUMBER OF QUESTIONS	PARTICIPANTS' SCORES			
	PRETEST	%	POSTTEST	%
15			1	4.0
14			6	24.0
13			7	28.0
12			8	32.0
11			2	8.0
10	4	16.0		
9	6	16.0		
8	8	32.0		
7	3	12.0	1	4.0
6	2	8.0		
5	1	4.0		
4				
3	1	4.0		
N	25	100.0	25	100.0
MEAN	8.0		11.6	
S.D	1.7		1.4	
RANGE	3-10		7-14	

APPENDIX II

THE PARTICIPANTS' EVALUATION OF THE WORKSHOP CONTENT AND THE INSTRUCTOR'S EFFECTIVENESS

PARTICIPANT'S EVALUATION OF THE
THE WORKSHOP CONTENT

TOTAL POINTS	N	PERCENT	
30	4	17.4	
29	1	4.3	
28	2	8.7	
27	1	4.3	
26	4	17.4	Mean - 25.6
25	2	8.7	
24	5	21.7	S.D. - 3.4
23	2	8.7	
19	1	4.3	
16	1	4.3	
N	23	100.0	

PARTICIPANT'S EVALUATION OF THE
WORKSHOP INSTRUCTOR

TOTAL POINTS	N	PERCENT	
50	5	20.0	
48	2	8.0	
47	2	8.0	
46	1	4.0	
45	2	8.0	
44	4	16.0	Mean - 44.3
43	1	4.0	
40	2	8	S.D. - 8.2
33	3	4.0	
N	25	100.0	

APPENDIX II

THE STUDENTS' PRE/POST KNOWLEDGE/

SKILL TEST

A. PERSONAL INFORMATION

1. NAME_____ DATE_____
2. AGE 5 6 7 8 9 10 11 12 13 14
3. GRADE 2 3 4 5 6 7 8
4. HOME-COMPUTER? YES NO
5. HOME-TYPEWRITER? YES NO
6. PIANO LESSONS? YES NO
7. INTEREST IN USING TYPING SKILL? - LOW MED HIGH
8. PRETEST 5-MIN GW

GW	ERRORS	CHART
____	____	____

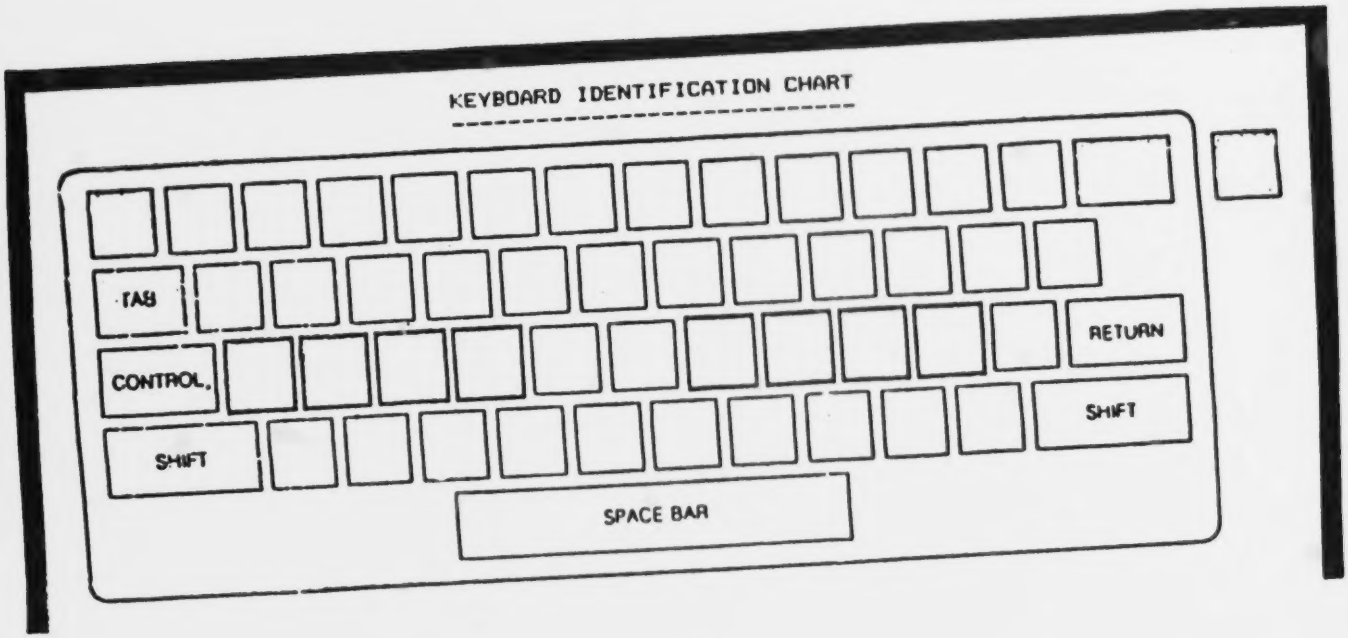
9. POSTTEST 5-MIN GW

GW	ERRORS	CHART
____	____	____

B. LINES FOR 5-MINUTE PRE/POST TEST

good form helps to build a good rate.
i will look at the line and use good
form all the time. each day i will
do the work in the right way. my
goal is to become better each day.
my fingers will go to the right keys
with quick strokes.

C. KEYBOARD IDENTIFICATION CHART TO BE USED AS PART OF THE STUDENTS' PRE/POST KNOWLEDGE/SKILL TEST



APPENDIX IV

1-MINUTE TIMING SHEET

ONE-MINUTE TIMINGS

NAME_____ GRADE_____

	Date	rate	-	errors	=	NWPM	rate	-	errors	=	NWPM
1	____	____		____		____	____		____		____
2	____	____		____		____	____		____		____
3	____	____		____		____	____		____		____
4	____	____		____		____	____		____		____
5	____	____		____		____	____		____		____
6	____	____		____		____	____		____		____
7	____	____		____		____	____		____		____
8	____	____		____		____	____		____		____
9	____	____		____		____	____		____		____
10	____	____		____		____	____		____		____
11	____	____		____		____	____		____		____
12	____	____		____		____	____		____		____
13	____	____		____		____	____		____		____
14	____	____		____		____	____		____		____
15	____	____		____		____	____		____		____
16	____	____		____		____	____		____		____
17	____	____		____		____	____		____		____
18	____	____		____		____	____		____		____
19	____	____		____		____	____		____		____

Pretest ___/___ Pre chart ___

Posttest ___/___ Post chart ___

APPENDIX V

TEACHERS' PERCEPTION OF CORRECT KEYSTROKING BY STUDENTS DURING PRE/POST 5-MINUTE TIMINGS

TEACHER'S PERCEPTION OF CORRECT KEYSTROKING
BY STUDENTS DURING PRE-POST 5-MINUTE TIMINGS

PERCENT OF CORRECT KEYSTROKING	PRETEST OBSERVATION		POSTTEST OBSERVATION	
	N	%	N	%
91-100			1	4.0
81-90			12	34.8
71-80			9	36.0
61-70			2	8.0
51-60	3	12.0	1	4.0
41-50	2	8.0		
31-40				
21-30				
11-20	1	4.0		
0-10	19	76.0		
TOTAL	25	100.0	25	100.0
MEAN	13.2		82.3	
S.D.	18.2		14.9	

REFERENCES

Andrews, D. (1984, January). Teach Yourself Touch-Typing. Popular Computing, 180-187.

Bernazza, A., Bloomer, L., & Cline, M. (1971). An Experimental Test of A First-Grade Reading-Typewriting Program. In Reading: Process and Pedagogy, edited by George B. Schich and Merrill M. May. Nineteenth Yearbook of the National Reading Conference. Milwaukee, Wis.: National Reading Conference, 34-38.

Bork, A. (1985, October). Education and Computers: The Situation Today and Some Possible Futures. T.H.E. Journal, 92-97.

Brady, H. (1984, September). Who Needs Ten-Finger Typing? Classroom Computer Learning, 67-69.

Brembeck, C. S. (1971,). American University Response to Problems of Development Overseas. Viewpoints, 47(5), 101-108.

Brody, H. (1983). Machines That Read Move Up a Grade. High Technology, 60(2), 33.

Casad, K, H. (1969). From Keyboard to Formal Manuscripts in 27 Hours. The Journal of Business Education, 40, 149-150.

Charp, S. (1985). Editorial. T.H.E. Journal, 12(6), 11.

Coates, J. (1984). What Principals Should Know about Telematics: Their Impact on Education. NASSP, 68(47), 41-49.

Conrad, E. (1935). A Study of the Influence of Manuscript Writing and of Typewritng on Childrens' Development. Journal of Educational Research, 29, 254-265.

Cowles, M., Hedley, M., & Robinson, M. (1983). An Analysis of Young Children Learning Keyboarding Skills. Bethesda, MD. (ERIC Document Reproduction Service No. ED 238 542)

Cory, L. (1984). Computer Pointing Devices: Living With Mice. High Technology. 4(1), 61.

Cothran, A., & Mason, G. (1978). The Typewriter: Time-tested Tool for Teaching Reading and Writing. The Elementary School Journal, 78(3), 171-173.

Craighead, D., & Switzer, M. E. (1983, September). Typing the Key to Computer Literacy? Instructor, 179-181.

Dacus, J., & Dacus, D. (1983, October). Time Bomb in Educational Computing. Educational Computer, 50-51.

Davis, B., & Little, M. (1984). Keyboarding for Computer Efficiency in a Gifted/Talented Program. Journal of Business Education, 60(1), 104-107.

Dickey-Olsen, P. (1982, April). Remember When Business Educators Taught Business Classes. Journal of Business Education, 11-12.

Dierks, C. (1977). Evaluation of an Automated Touch-Typing System. University of Northern Colorado, Laboratory School. (ERIC Document Reproductiion Service No. ED 11 5050)

Ekphick, M. (1984, March/April). Unraveling the Mysteries of Speech Recognition. High Technology, 71-74.

Erickson, L.W. (1967). Practices and Preferences in Teaching Typewriting, South-Western Publishing Company.

Erickson, L.W. (1983, Spring). Teaching Typewriting for Adaptability and as an Aid to Learning. CBE Journal,

Erthal, M. (1985, February). The Status of Keyboarding. Journal of Business Education, 192-193.

Fleishman, E.A. & Rich S. Role of Kenesthetic And Spatial-Visual Abilities in Perceptual-Motor Learning. Journal of Experimental Psychology, 66, 6-10.

Gage. N.L. (1984, October). That Do We Know About Teaching Effectiveness? Phi Delta Kappan, 87-93.

Green, J.O. (1983, July). The Magic of Touch Technology. Popular Computing, 161-166.

Harvey, W. (1983). Optical Mark Reader: What's New? Electronic Learning, 3(1), 108-112.

Hawkins, W. (1985). Bits & Bytes. Popular Science, 22(1), 84.

Holmquist, D. (1983). Business Education: Some Controversial Questions. Business Education Forum, 37(5), 3-4.

Jackson, T. (1984, April). Keyboarding: The K-12 Curriculum in Minnesota. CUE Bulletin, 12-13.

Joyce. B.R. & Showers, B. (1981, April). Teacher Training Research: Working Hypotheses for Program Design and Direction or Further Study. A paper presented to the annual meeting of the American Educational Research Association, Los Angeles, California.

Kaake, D. (1983, March). Teaching Elementary Age Children Touch Typing as an Aid to Language Arts Instruction. The Reading Teacher, 640-644.

Kercher, L. (1983). Life-Skill Learning for Preadolescents. Business Education Forum, 37(9), 4.

Kisner, L. (1984). Keyboarding-A Must in Tomorrow's World. The Computing Teacher, 11(6), 21-22.

Kleiman, G. (1984, February) Learning With Computers: Potentials and Limitations. Compute!, 120-123.

Kurth, R.J & Stromberg, L.J. (1984, December). Using Word Processing in Composition Instruction. Paper presented at the Annual Meeting of the American Reading Forum, Orlando, Florida. (ERIC Document Reproduction Services No. ED 251 850)

Lambrecht, J. J. & Pullis, J. M. (1983, May/June). Computer Assisted Instruction in Typing. Educational Computer Magazine, 66-68.

Lowd, B. (1983, January/February). [interview with Henry Olds, editor of Classroom Computer News]. Classroom Computer News, 3(3), 24.

Mason, B. & Mason, M. (1984). Graphics Tablets: How to Draw on a New Technology. Electronic Learning, 3(4), 74-78.

McCarley, B. (1984, December). Qwerty-Uiop and Other Aids for Developing Keyboarding Skills for Computer Users. Educational Technology, 45-47.

McClurg, P. (1984). Keyboarding - An Issue in the Elementary School. Unpublished master's thesis, University of Oregon, Eugene, Oregon.

McLean, G. N. (1984,) Teaching Keyboarding Typewriting. (Rapid Reader #5). Delta Pi Epsilon. (ERIC Document Reproduction Service No. ED 250 500)

Miller, S. (1984) Plugging Your Pencil Into the Wall: An Investigation of Word Processing and Writing Skills at the Middle School Level. Unpublished doctoral dissertation, University of Oregon, Eugene, Oregon,

Mills, A. W. (1984). Pointing is Primal. InfoWorld, 5(52), 11.

Nicholson, R. (1983). Integrating Voice in the Office World. Byte, 8(12), 177-182.

Oksendahl, W.J. (1972). Keyboard Literacy for Hawaii's Primary Children. Educational Horizons, 51, 20-25.

Ownby, A. C. & Perreault, H. (1983). Keyboarding: A No-fail Model. Business Education Forum, 37(9), 9-12.

Pollard, J. (1984). Adaptive Devices for Special Education. Electronic Learning, 3(5), 44-46.

Rauch, V. C. & Yanke, P. B. (1982). Keyboarding in Kindergarten - is it Elementary? Business Education Forum, 37(3). 19-20.

Ray, M. L. (1977). Ten Finger Exercise: Type and Learn. Teacher, 94, 45-47.

Robinson, J. W. & Lessenberry, D. D. (1977). Relationship Between Keystroking Content of Initial Typewriting Practice and 'Real World' Communication, NABTE Review, 36.

Robinson, J. W. & Johnson, G. L. (1982) Learning Microcomputer Keyboarding. The Balance Sheet, 63(5), 228-231.

Sandberg-Diment, E. (1984, January) The Most Crucial Computing Skill. Science Digest, 30-31.

Schmidt, J. B. (1983). Keyboarding the State of the Art. Blacksburg, Vir: Virginia Polytechnic Institute. (ERIC Document Reproduction Service No. ED 236 352)

Schmidt, J. (1984). Computer Keyboarding Curriculum for Middle and Junior High School Students. Burlington, Ct. Regional School District #10. (ERIC Document Reproduction Service No. ED 182 465)

Shea, T. (1983). Voice-Recognition Technology Still in its Infancy. InfoWorld, 5(36), 18-23.

Showers, B. (1982). A Study of Coaching in Teacher Training. Eugene: University of Oregon, Center for Educational Policy Management.

Singh, M. C., Brosier, J. T., & Smith, L. R. (1977). Using the Typewriter to Improve Reading and Spelling. Richmond County Public Schools. (ERIC Document Reproduction Service No. ED 186 852)

Sinks, T.& Thurston, J. (1972). Effect of Typing on School Achievement in Elementary Grades. Educational Leadership, 29, 344-348.

Sormunen, C. (1984). Inservice Workshop: One Answer to the Issue of Elementary School Keyboarding. Journal of Business Education, 60(1), 14-16.

Spencer, D. D. (1983) An Introduction To Computers. Charles E. Merrill Publishing Co. Columbus, Ohio, 76.

Stephens, R. (1984, May). Voice Recogniton. PC World, Special Edition, 47-49.

Stewart, J. 7 Jones, B. (1983). Keyboarding Instructions: Elementary School Options. Business Education Forum, 37(7), 11-12.

Sunkel, M.J. & Cooper, M. (1982). Teaching Touch Keyboarding on Computer Terminals. Business Education Forum, 37(1), 18-21.

Switzer, M. E. (1977). Typing Fun. Santa Barbara, Calif. The Learning Works, 1977.

Talmy, S. (1984, September). Computing for the Handicapped. Creative Computing, 180-84.

Tate, M. W. (1943). Use of the Typewriter in Remedial Reading and Language. Elementary School Journal, 43, 481-485.

Tiddens, M. (1984). Input. PC World, Special Edition, 44-46.

Triebe, E. J. (1981). A Critical Review of an Article on Printing. The World Book Encyclopedia, 15, 700-708.

Troutner, J. (1983, December). The Issues of Teaching Typing. Educational Computer, 14, 48-49.

Wetzel, K. (1985, June). Keyboarding Skills: Elementary, My Dear Teacher? The Computing Teacher, 15-19.

Zientara, P. (1984). Touch Technology Mouse Works Without Moving. InfoWorld, 5 & 6(1), 64.